FLEX PANEL LID OR CAP

FIELD OF THE INVENTION

[0001] The present invention relates generally to lids or molded caps for containers. More particularly, the invention relates to lids that seal container openings by providing an axially movable center panel of the lid that causes the container-engaging surface of the lid to move outward thus creating or improving the seal with the container surface.

BACKGROUND OF THE INVENTION

[0002] Many foods or perishable goods are packaged in containers requiring repeated opening and closing. Once the container has been opened the first time by a consumer, the remainder of the product desired to be preserved generally must be stored in a sealed container. Therefore, resealable lids are preferably used to seal the product in the container to prevent exposure to contaminants, to prevent leakage of the contained product, and to maintain the freshness of the product. The originally sealed lid preferably also reduces transmission of moisture and oxygen, which expedite the spoilage of perishable goods.

[0003] Containers may include features to facilitate the sealing of the lid. U.S. Patent Number 3,080,993 to Livingstone, discloses a container and cover wherein the rim of the container includes a groove engageable means. Once the cover is positioned onto the container such that the groove of the cover is positioned on the rim of the container, the knob is compressed to seal the container. The cover includes a thin flex line that allows the knob to move relative to the groove, and the cover includes a groove-engaging means that forms a tight engagement with the groove engageable means of the container when the knob is compressed. The covers are designed particularly for containers with groove engageable means.

[0004] Other lids may create a seal, in a similar fashion, with a container that does not include special groove-engaging means. U.S. Patent Number 3,244,308 to Esposito, discloses a molded cap with a skirt surrounding a transverse wall that is molded in a convex configuration and that includes grooves such that when the transverse wall is distorted to a concave configuration, the skirt exerts radial pressure on the container surface. The transverse wall and skirt of the cap are molded as a one piece integral

structure. Furthermore, the cap does not include additional materials to enhance the barrier properties of the cap.

[0005] Lids of the above described type may be compressed or distorted many times during the expected life of the lid. Because the rigid structural portions and the moving portions of the lids consist of a single material, such iterations of compression or distortion may weaken or rupture the moving portions of the lid, thus rendering the lid inoperative or diminishing the sealing properties of the lid. Furthermore, the lids described above do not incorporate barrier-enhancing materials. Therefore, a need exists for a lid designed to withstand many iterations of sealing and unsealing without diminished performance and for a lid that provides enhanced barrier properties.

SUMMARY OF THE INVENTION

[0006] The invention addresses the above needs and achieves other advantages by providing a flex panel lid that includes a center panel, a rim portion, and a hinge portion. The hinge portion connects an outer perimeter of the center panel to the rim portion and allows axial movement of the center panel relative to the rim portion. Axial movement of the center panel causes the rim portion to be moved in a radial direction. When the lid is positioned on a container opening, radial movement of the rim portion engages an inner wall of the groove of the rim portion against an inner surface of the container, thus creating a seal. The hinge portion comprises a material that is relatively more compliant than the material of the center panel and rim portion. The hinge portion in some embodiments of the invention includes two flex points.

[0007] One embodiment of the present invention includes a center panel and rim portion made of a thermoplastic material and a hinge portion made of an elastomer. A further embodiment includes a container-engaging surface made of pliable material that is more compliant than the other portions of the rim portion so as to promote sealing with the inner surface of the container. The lid may be structured so that axial movement of the center panel toward the container moves the rim portion radially outward, or the lid may be structured so that axial movement of the center panel away from the container moves the rim portion radially outward. The lid may also include a pull feature to facilitate axial movement of the center panel.

[0008] Another embodiment of the invention provides a molded cap with a center panel, a hinge portion, and a rim portion and includes a flexible barrier membrane integrated into the cap. In a further embodiment, the flexible barrier membrane may include a lower foil layer and an upper polymer layer for joinder with the polymer material of the molded cap. The cap may be molded onto the upper polymer layer of the flexible membrane such that the lower foil layer of the flexible membrane defines a container-facing surface of the cap. In other embodiments of the invention, the flexible membrane may extend radially to the groove of the rim portion and may be a metallized film such as metal foil.

[0009] A method of manufacturing a flex panel lid is provided. To manufacture one embodiment of the lid, a first mold material is injected into a mold to form a center panel and a rim portion encircling the center panel, then a second mold material different than the first mold material is injected into the mold to form a hinge portion connecting the outer perimeter of the center panel to the rim portion. Once the materials are hardened, the center panel is axially moveable relative to the rim portion. In one embodiment, the first mold material is less compliant than the second mold material. In a further embodiment, the first mold material is a thermoplastic material and the second mold material is an elastomer.

[0010] A method for manufacturing a molded cap is also provided. A flexible barrier membrane is positioned in the mold and a mold material is injected into a mold to form a center panel, a hinge portion, and a rim portion. After hardening of the mold material, the hinge portion allows the center panel to move axially relative to the rim portion. In one embodiment, the mold material is injected onto an upper polymer layer of the flexible membrane and the lower foil layer of the flexible membrane defines a container-facing surface of the cap. In a further embodiment the flexible barrier membrane extends radially to a container-engaging surface of the rim portion. In yet another embodiment, the flexible barrier membrane is a metallized film.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 is a perspective view of a lid, partially in section, in accordance with one embodiment of the invention;

FIG. 2 is a schematic, cross-sectional view of a lid, in accordance with a second embodiment of the invention, formed by a two shot mold process, showing the lid in the unsealing position;

FIG. 3 is a view similar to **FIG. 2**, showing the lid in the sealing position;

FIG. 4 is a view similar to **FIG. 2**, showing a lid, in accordance with a third embodiment of the invention, formed by a two shot mold process with a container-engaging surface in the groove of the rim portion formed of a different material from the rest of the rim portion, showing the lid in the unsealing position;

FIG. 5 is a view similar to **FIG. 2**, showing a lid, in accordance with a fourth embodiment of the invention, formed with a flexible barrier membrane, showing the lid in the unsealing position;

FIG. 6 shows the lid of **FIG. 5** in the sealing position;

FIG. 7 is an enlarged, partial cross-sectional view of the lid shown in **FIG. 5** showing the flexible barrier membrane molded to the hinge portion and the rim portion; and

FIG. 8 is a perspective view of a lid with a pull feature.

DETAILED DESCRIPTION OF THE INVENTION

[0012] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0013] **FIG. 1** illustrates a flex panel lid **10** of the present invention. The lid **10** has a center panel **12** surrounded by a hinge portion **14** and a rim portion **20**. The hinge portion **14** includes a first flex point **16** and a second flex point **18** spaced radially outward thereof. The hinge portion **14** allows the center panel **12** to be moved axially relative to the rim portion **20**. Axial movement of the center panel **12** moves the rim portion **20** radially. When lid **110** is placed on a container **50**, as shown in **FIG. 2**, axial movement of the center panel **12** moves the rim portion **20** from the unsealing position of **FIG. 2** to the sealing position of **FIG. 3** to create a seal for storage of the products stored within the container.

[0013] The lid **10** as shown in **FIG. 1** is a circular lid; however, other embodiments of the invention may include shapes such as square, rectangular, and oval, to list a few non-limiting examples. The terms radial and radially are used to describe the illustrated embodiment of the lid **10**; however, other embodiments having non-circular shapes are also described wherein the radial direction corresponds to a direction generally outward from a center of the lid. The rim portion **20** includes a groove **30** defined by the radial distance between an inner wall **24** and outer wall **28**. A top flange **26** connects inner wall **24** to outer wall **28**, as shown in **FIG. 2**. The groove **30** is structured and arranged to receive the edge **56** of container **50** defining the opening **52** of the container to be sealed. As shown in **FIG. 2**, the edge **56** comprises an inner surface **54** and an outer surface **58** and includes no additional features to facilitate attachment and sealing of the lid **10**. However, other embodiments of the invention may comprise a lid **110** with a groove **30** adapted to cooperate with additional features on edge **56**, such as a bead or the like.

[0014] **FIG. 2** illustrates the lid **110** in the unsealing position, while **FIG. 3** shows the lid in the sealing position. Axial movement of the center panel **12** moves the rim portion **20** radially. The lid **110** of the present invention shown in **FIG. 2** and **FIG. 3**, as well as lid **210** in **FIG. 4** and lid **310** in **FIG. 4** and **FIG. 5**, is structured such that axial movement of the center panel **12** in the direction toward the container **50** moves the rim portion **20** radially outward. Alternatively, the lid can be arranged such that movement of the center panel **12** axially away from the container **50** causes the rim portion **20** to move radially outward.

[0015] The center panel **12** of the illustrated embodiment consists of a flat circular disc. The center panel **12** is preferably located in the center of lid **110** and includes an outer perimeter **22**. As shown in **FIG. 2**, the center panel **12** is a flat disc with no surface features or variations in thickness; however, other embodiments of the invention may include surface textures, portions of differing thicknesses, or ornamental designs, to list some non-limiting examples. The center panel **12** also is not required to be flat but may include either convex or concave curvature. Furthermore, a pull feature **448**, as seen in **FIG. 8**, is included in other embodiments of a lid **410** to facilitate axial movement of the center panel **12**. The pull feature **448** shown in **FIG. 8** is a simple flexible hoop, though a pull feature of any configuration may be incorporated into the top surface of the center panel **12**, such as a flat flange perpendicular to the center panel, a flexible flap projecting upwards, or a mushroom-type feature, to list some non-limiting examples.

[0016] The hinge portion **114** surrounds the center panel **12** and is attached to the outer perimeter **22** of the center panel **12**, as shown in **FIG. 2**. The hinge portion **114** is also attached to an inwardly projecting flange **32** of the rim portion **20**. The hinge portion **114** illustrated in **FIG. 2** and **FIG. 3** includes two flex points **116** and **118**. However, other embodiments of the invention may include any number of flex points. The first flex point **116** and the second flex point **118** are connected by a web that generally is of the same thickness as the center panel **12**; however, the web may have a dissimilar thickness in other embodiments. The flex points **116** and **118** are each defined by a channel on the top surface of the lid **110** and a channel on the bottom surface of the lid at corresponding distances from the center of the lid. Therefore, the flex point **116** is defined by a top channel and a bottom channel and the flex point **118** is defined by a top channel and a bottom channel such that the thickness of the hinge portion **114** at the flex points is less than the thickness of the web connecting the flex points and less than the thickness of the adjacent center panel **12** or the adjacent inwardly projecting flange **32** of rim portion **20**. The embodiment of lid **10** shown in **FIG. 1** does not include the channels at the flex points **16** and **18**, such that the thickness of the flex points is approximately equal to the thickness of the web, yet the lid **10** functions in a similar fashion as the lid **110** of **FIG. 2**. Indeed, the ability of the lid to flex and pivot about a particular point can be provided by tailoring the thickness distribution of the lid and the radii of curvature of the lid surfaces

in those regions where the thickness is changing rapidly in the radial direction; thus, the hinge points do not have to be as sharply defined as those depicted in **FIG. 2**.

[0017] The four channels correlating to the two flex points **116** and **118** are configured to predispose the lid **110** to either the unsealing position of **FIG. 2** or the sealing position of **FIG. 3**. An example of the flex points **116** and **118** predisposing the lid **110** to either the unsealing or sealing position would be where if the center panel **12** is above the plane defined by the inwardly projecting flange **32** of the rim portion **20**, the center panel would tend to move up to the unsealing position, but if the center panel is aligned with or below the plane defined by the inwardly projecting flange of the rim portion, the center panel would tend to move down to the sealing position. The memory of the hinge portion **114** material provides the inducement for predisposing the lid **110**.

[0018] The channels defining the flex points are preferably structured such that when the center panel **12** is moved axially the rim portion **20** moves a corresponding distance in a radial direction. The correlation between the axial distance moved and the radial distance moved is governed by the angle of the hinge portion in the unsealing position compared to the angle of the hinge portion in the sealing position. The size, shape, and location of the channels defining the flex points **116** and **118** also define the angles of the hinge portion **114**, as well as the location of the center panel **12** and the rim portion **20**, in the unsealing and sealing positions. As seen in **FIG. 2** and **FIG. 3**, the angle of the hinge portion **114** relative to the center panel **12**, which is generally equal to the angle of the hinge portion relative to the inwardly projecting flange **32** of the rim portion **20**, in the unsealing position of **FIG. 2** is greater than the angle in the sealing position of **FIG. 3**. This difference in angle correlates to the different radial locations of the rim portion **20** in the unsealing and sealing positions. Therefore, increasing the difference in angles of the unsealing and sealing positions increases the difference in radial locations of the rim position such that optimal sealing my be provided for a specific container. Furthermore, the shape of the hinge portion **114** and the material used to form the hinge portion govern the amount of force required to move the center panel **12** axially and the rim portion **20** radially. The force required to convert the lid **110** to the sealing position is also governed by the outside diameter of the inner wall **24** of the rim portion **20** compared to the inside diameter of the container opening **52**.

[0019] The rim portion **20** surrounds the center panel **12** and the hinge portion **114**. The rim portion **20** includes an inwardly projecting flange **32** projecting from an inside surface of the inner wall **24** toward the center of the lid **110**. The outer extremity of the hinge portion **114** is connected to an inner extremity of the inwardly projecting flange **32**. The inwardly projecting flange **32** shown in **FIG. 2** is located axially between the lower portion of the inner wall **24** and the upper portion of the inner wall. However, in other embodiments of the invention, the inwardly projecting flange **32** may be located at any axial point along the inner wall **24**. A top flange **26** is attached to the upper portion of the inner wall **24** and extends radially outward to the outer wall **28**. As shown in **FIG. 2**, the outer wall **28** extends downwardly from the top flange **26**, but in other embodiments may include an upwardly extending portion.

[0020] The inner wall **24** of **FIG. 2** includes a container-engaging feature **34** comprising multiple peripheral ridges on the outside surface of the inner wall. As shown in **FIG. 3**, the container-engaging feature **34** engages the inner surface **54** of the container **50**. The container-engaging feature **34** preferably enhances the sealing ability of the inner wall **24**.

[0021] An alternative container-engaging surface **236**, as illustrated in the embodiment of **FIG. 4**, may also be incorporated for enhanced sealing of lid **210** to container **50**. The container-engaging surface **236**, is formed with a pliable material that is more compliant than the material comprising the other portions of the rim portion **20** to improve the sealing ability of the lid **210**. The surface **236**, for example, can more-readily conform to irregularities in the shape or surface of the container edge. Additionally, the material making up the surface **236** can be higher-friction material and thereby better resist detachment of the lid **210** from the container **50**.

[0022] In operation, the lid **110** in **FIG. 2** and **FIG. 3** is placed over the opening **52** of container **50** so that the groove **30** of rim portion **20** receives the edge **56** of the container. Clearance is provided between the container-engaging feature **34** of the inner wall **24** of rim portion **20** and the inner surface **54** of the container, but other embodiments may provide nominal engagement of the container-engaging feature **34** with the inner surface **54** such that resistance to placement of the lid **110** onto container **50** is minimal. Other embodiments may include a container-engaging surface **236**, as in **FIG. 4**. Once the top

of edge **56** engages the bottom surface of the top flange **26**, the lid **110** may be converted from the unsealing position of **FIG. 2** to the sealing position of **FIG. 3**. Applying force in a direction toward the container **50** to the center panel **12** moves the center panel toward the container and the rim portion **20** outwardly. The container-engaging feature **34** engages the inner surface **54** of the container **50** while the lid **110** is being converted from the unsealing position to the sealing position. The container-engaging feature **34** maintains engagement with the inner surface **54** of the container **50** once the lid **110** is in the sealing position, and the hinge portion **114** keeps the lid in the sealing position. While the lid **110** is in the sealing position, the contents of the container **50** are protected from contaminants of the surrounding environment and are prevented from leaking out of the container.

[0023] To remove the lid **110** in the sealing position from the container **50**, as shown in **FIG. 3**, the center panel **12** preferably is first moved axially away from the container to convert the lid to the unsealing position. A pull feature **448**, as shown in **FIG. 8**, is preferably provided to facilitate the axial movement of the center panel **12** away from the container. Once the center panel **12** is pulled to the unsealing position, the container-engaging feature **34** of the inner wall **24** of the rim portion **20** is moved inwardly such that the container-engaging feature no longer engages or nominally engages the inner surface **54** of the container **50** so that the lid **110** may be removed with minimal resistance. Alternatively, it may be possible to pry the lid **110** off the container **50** without first converting the lid to the unsealing position, although a greater amount of force may be required to do so.

[0024] At least one motivation for sealing a container **50** is to prevent exposure of the contained product to moisture and oxygen. Spoilage of many products, in particular food products, is accelerated when the product is exposed to moisture or oxygen. Therefore, transmission of moisture and oxygen through a lid should be minimized or prevented not only before the container is first opened by a consumer, but also while the container is subsequently resealed. Accordingly, the lid of the present invention preferably includes barrier materials to reduce moisture and oxygen transmission rates. Various types of barrier materials can be used. In one advantageous embodiment, the cap **310** of **FIG. 5** and **FIG. 6** is a molded cap that integrates a flexible barrier membrane **340**. A flexible

barrier membrane **340** improves the barrier properties of the cap **310** so as to prevent the passage of moisture and/or oxygen. One embodiment of cap **310** includes a flexible barrier membrane **340** that is a metallized film, or more particularly, is a metal foil. Other embodiments include any type of flexible barrier membranes. The flexible barrier membrane **340** of **FIG. 5**, includes an upper polymer layer **342** and a lower foil layer **344** such that the cap **310** is molded onto the upper polymer layer **342** and the lower foil layer defines a bottom surface or container-facing surface of the cap. The upper polymer layer **342** of the flexible barrier membrane includes materials to enhance the bond between the cap material and the flexible barrier membrane **340**. The flexible barrier membrane **340** of **FIG. 7** extends radially from the center of the cap **310** to the groove **30** of the rim portion **20**. The flexible barrier membrane **340** preferably spans the entire opening **52** of the container **50**, as shown in **FIG. 6**, to provide the maximum seal for the container. However, other embodiments of the cap **310** may integrate a flexible barrier membrane **340** that does not extend to the groove **30** of the rim portion **20**. Furthermore, other embodiments of the cap **310** may include a flexible barrier membrane **340** that defines a top surface of the cap or is encased within the cap.

[0025] The lid **110** illustrated in **FIG. 2** is manufactured by a two shot mold process such that the center panel **12** and the rim portion **20** consists of a first mold material and the hinge portion **114** consists of a second mold material. The first mold material is different from the second mold material, and in one embodiment of the invention is relatively less-compliant than the second mold material. A further embodiment of the invention includes a first mold material that is a thermoplastic and a second mold material that is an elastomer. Non-limiting examples of materials that may be used as the first mold material include various polyolefins (including homopolymers, co-polymers, etc.), polyester, and others. Non-limiting examples of second mold materials include various elastomeric materials such as thermoplastic rubber, thermoplastic elastomer, or any other suitable material. Utilizing a relatively less-compliant material for the center panel **12** and rim portion **20** provides structural strength to the lid **110**. Furthermore, the relatively more-compliant material of the hinge portion **114** requires less force to move the center panel axially and enables the hinge portion to undergo additional cycles of

actuation between the unsealing and sealing positions without damaging the material of the relatively thin flex points **116** and **118**.

[0026] A method of manufacturing the lid **110** of **FIG. 2** and **FIG. 3** requires a mold that includes a cavity shaped as a lid in either the unsealing or sealing position. A first mold material is injected into the mold such that the center panel **12** and the rim portion **20** are formed. The outer perimeter **22** of the center panel **12** and the inwardly projecting flange **32** of the rim portion **20** are separated by an axial and radial distance. The second mold material is injected into the portion of the mold separating the outer perimeter **22** of the center panel **12** and the inwardly projecting flange **32** to form the hinge portion **114** that connects the outer perimeter to an inside edge of the inwardly projecting flange. The second mold material may be injected prior to, simultaneous with, or subsequent to the injection of the first mold material, but must be completed in a timely fashion to maximize the bond strength at the interface between the hinge portion **114** and the outer perimeter **22** of the center panel **12** and between the hinge portion **114** and the inwardly projecting flange **32**. After the first mold material and the second mold material have been fully injected into the mold, the materials are sufficiently hardened so that the lid **110** will retain the configuration provided by the mold after the lid has been removed from the mold. Various hardening techniques may be used, such as with air cooling or by UV exposure, to list two non-limiting examples; however, optimal hardening techniques for the specific mold materials are preferably used.

[0027] Manufacture of the lid **210** of **FIG. 4** includes an additional injection of mold material into the groove **30** of the rim portion **20** to form a container-engaging surface **236**. The container-engaging surface **236** consists of a pliable material that is more compliant than other portions of the rim portion so as to promote sealing of the lid **10** to the inner surface **54** of the container **50**. The container-engaging surface **236** of **FIG. 4** is positioned on the outside surface of the inner wall **24** and on the bottom surface of the top flange **26**. Other embodiments of the lid **210** may include a container-engaging surface **236** positioned only on the outside surface of the inner wall **24** or consisting of a strip of pliable material with an axial height less than the axial height of the outside surface of the inner wall **24**. The pliable material of container-engaging surface **236** provides more surface area for contacting the inner surface **54** of the container **50** than the container-

engaging feature **34** of **FIG. 2** and enhances the sealing ability of the lid by reducing the possibility of gaps in the sealing engagement. As illustrated in **FIG. 4**, the container-engaging surface **236** consists of the same second mold material of hinge portion **114**, and during manufacture is injected concurrently with the injection creating the hinge portion. Other embodiments of the invention may include a container-engaging surface **236** of a mold material different than the rim portion **20** and the hinge portion **114**.

[0028] The cap **310** of **FIGS. 5, 6**, and **7** is manufactured by a method similar to the embodiment of **FIG. 2**, but integrates the flexible barrier membrane **340**. Before injection of one or multiple mold materials into the mold, the flexible barrier membrane is positioned in the mold in a location corresponding to the position of the flexible barrier membrane in the finished cap **310**. For the cap **310** of **FIG. 5**, the flexible barrier membrane **340** is placed on the bottom surface of the mold pattern with the lower foil layer **344** facing downward on the mold such that injection of the mold material will occur above the flexible barrier membrane only. This positioning allows the upper polymer layer **342** to contact the injected mold material to create the bond between the flexible barrier membrane **340** and the mold material of cap **310**. Other embodiments of the cap **310** may include an upper layer **342** that includes adhesives, such as heat-sensitive adhesives to name a non-limiting example, or other materials to facilitate bonding between the flexible barrier membrane **340** and the mold material. As seen in **FIG. 5**, the flexible barrier membrane **340** extends radially to the groove **30** of the rim portion **20**. In so doing, the flexible barrier membrane **340** must match the contours of the hinge portion **314** and the inner wall **24**, as shown in **FIG. 7**. To insure the flexible barrier membrane **340** is properly located and the flexible barrier membrane includes the intended configuration, the flexible barrier membrane of some embodiments of the invention requires force during the positioning step so that the flexible barrier membrane is shaped to match the contours of the mold and hence the resulting features of the cap **310**. Other embodiments may require only positioning of the flexible barrier membrane **340** into the mold, wherein the injection of the mold material sufficiently shapes the flexible barrier membrane by the force or pressure of the injection step.

[0029] The cap **310** of **FIG. 5** and **FIG. 6** is manufactured with one mold material comprising the center panel **12**, the hinge portion **314**, and the rim portion **20**; therefore, a

single injection of a first mold material onto the flexible barrier membrane **340** for the cap **310**. Other embodiments of the invention include a cap **310** manufactured by a two shot mold process, similar to the lid **110** of **FIG. 2** and **FIG. 3**, wherein the center panel **12** and rim portion **20** consist of a first mold material that is relatively less-compliant than the second mold material of the hinge portion **314**. Further embodiments include a cap **310** with a flexible barrier membrane **340** and a container-engaging surface similar to the container-engaging surface **236** of **FIG. 4**. The flexible barrier membrane **340** of such an embodiment preferably extends radially to the groove **30** but does not contact the container-engaging surface **236**, thus providing improved barrier properties while creating an improved seal. Further embodiments of cap **310** may include any combinations of the features described herein.

[0030] The pull feature **448**, as represented in **FIG. 8**, is preferably incorporated into the lid **410** during the mold process. The mold used to manufacture the lid **410** includes a cavity corresponding to the pull feature **448** such that when a mold material is injected into the mold to form the center panel **12**, mold material also enters the cavity defining the pull feature. In such a way, the pull feature **448** is integrated into the lid **410** during the mold process, and the lid **410** is a finished product after hardening. However, other embodiments of the invention may include a pull feature **448** that is added to a lid **410** subsequent to the hardening step, such as with a fastener or adhesive, to provide two non-limiting examples.

[0031] Many modifications and other embodiments of the invention set forth herein will come to mind to one skilled in the art to which the invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.